

March __, 2014

To: Randy Fiorini, Chair, Delta Stewardship Council
Charles Bonham, Director, California Department of Fish and Wildlife

From: Delta Independent Science Board

Subject: Interim review of the draft EIR/EIS for the Bay Delta Conservation Plan

The current BDCP documents provide a comprehensive assessment of efforts to reverse declines in water reliability and ecosystem health in California. The documents offer thorough descriptions, impressive detail, and probing analyses of a portfolio of potential actions that are to be based on science.

These strengths notwithstanding, the overall result falls short of being good enough for a project this large, complex, expensive, and important. For example: (a) Many of the impact assessments hinge on optimistic assumptions about the feasibility and effectiveness of the proposed conservation actions. (b) Few of the underlying models have been used to bracket a range of uncertainties or to evaluate the sensitivity to assumptions, which themselves are rarely apparent. (c) Insufficient attention is given to interactions among species, landscapes, and the proposed actions themselves. (d) The impact assessments give little attention to levee failures, San Francisco Bay, and San Joaquin Valley agriculture. (e) The details of how adaptive management will be implemented are left to a future management team without explicit consideration of situations where adaptive management may be inappropriate or impossible, and with little evidence of contingency plans if things don't work as planned.

These are among the main findings of our legislatively mandated review of the Draft BDCP EIR/EIS. This cover memo summarizes comments that are elaborated in two appendices. The memo also offers suggested improvements to address many of the problems identified.

Review Process and Approach

The Delta Reform Act of 2009 (§85320(c)) instructed the Delta Independent Science Board to review the Bay Delta Conservation Plan (BDCP) Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) and to submit its comments to the Delta Stewardship Council and the California Department of Fish and Game. To meet this responsibility, we conducted interviews, held briefings, and spent scores of hours reviewing the chapters and appendices of the EIR/EIS. Our review focuses on the science in the EIR/EIS: how well the statements and conclusions are supported by current scientific information; how science is applied to proposed actions; and how science is communicated. To understand the content of the EIR/EIS, we found it necessary to extend our review to include chapters and appendices in the BDCP Plan. We reviewed files posted on December 9, 2013, at <http://baydeltaconservationplan.com/PublicReview.aspx>.

We regard the BDCP as a rare opportunity to coordinate strategic decisions regarding infrastructure, environmental, regulatory, institutional, and financial aspects of Delta management, all in the context of improving water-supply reliability *and* ecosystem health in the Delta. We recognize the importance and uniqueness of this opportunity.

Our interim review has three parts:

Overview. This cover memo summarizes several main concerns and offers suggestions for improving the scientific framework of the BDCP and the content and presentation of the draft EIR/EIS itself.

Charge questions. Appendix A offers detailed responses to specific questions from the Delta Stewardship Council.

Resource chapters. Appendix B provides detailed reviews of individual chapters of the EIR/EIS.

Main Concerns

We noted several broad areas in which the EIR/EIS, including referenced parts of the BDCP Plan, is scientifically incomplete or insufficient. Addressing these deficiencies would improve the prospects for improving water reliability and ecosystem health through the BDCP.

1. *Expectations for the effectiveness of conservation actions are too optimistic.*—Throughout the EIR/EIS, the BDCP actions, supplemented by Avoidance and Minimization Measures and Mitigation Measures, are assumed to produce the anticipated benefits. This is an implausible standard of perfection for such a complex problem and plan. It is also assumed that any time lags between when impacts arise and the benefits of compensatory or mitigation actions emerge can be addressed through planned phasing of activities. Such expectations are unrealistically optimistic.

2. *The potential effects of climate change and sea-level rise are underrated.*—The BDCP Plan and EIR/EIS do a good job of describing how climate change and sea-level rise might influence communities and species and some aspects of hydrology, and how the BDCP actions may enhance resiliency and adaptation to these effects. However, the speed and magnitude of these changes may cause the consequences of conservation actions to not emerge as planned. The potential direct effects of climate change and sea-level rise on the effectiveness of actions, including operations that are part of new water conveyance facilities, are not adequately considered. Similar comments could be made about the treatments of other disrupting factors, such as levee failures, earthquakes, or invasive species, any of which has the potential to profoundly alter the desired outcomes of BDCP actions.

3. *Confounding effects of linkages and interactions are insufficiently considered.*—The Delta is a complex, interacting system. Actions in one place or for one species will affect dynamics there and elsewhere of the same or other species. Consequently, failure to meet the expectations of conservation actions will have cascading effects. By ignoring the competitive or predatory effects of one species on another, or the effects of habitat restoration in one place on downstream restoration projects, the effectiveness of actions may be compromised. Although some non-covered species are combined for analysis and some predation effects are considered, much of the EIR/EIS is focused on individual species, particular places, or specific actions that are considered in isolation from other species, places, or actions. The geographic scope of the EIR/EIS does not extend to include San Francisco Bay, although potential impacts from BDCP actions will likely affect the Bay. By failing to treat the Delta as a fully functioning and integrated ecosystem, potential synergistic or competing interactions among actions that may enhance or undermine their effectiveness may be overlooked.

4. *Scientific uncertainties are inconsistently and incompletely addressed.*—Every action and consequence discussed in the EIR/EIS is accompanied by uncertainties. Examples of such uncertainties include the designations of habitats for species, projections of entrainment, the effects of climate change and sea-level rise, the effectiveness of habitat restoration, the information and data available to support analyses and conclusions, the consequences of levee failures unrelated to BDCP actions, and model results used in the analyses. When combined, these uncertainties will be compounded and propagate. Although the BDCP Plan discusses some of these uncertainties, they are treated inconsistently in the EIR/EIS (particularly in the Executive Summary). When the outcomes of an action are considered too uncertain or speculative, the uncertainty may be used as a reason not to address the issue at all. Consequently, those charged with implementing the Plan may be

inadequately prepared to deal with uncertainty. Unaddressed, uncertainties pose a risk to the project as a whole.

5. *Assumptions are not stated clearly and consistently.*—An understanding of the underlying assumptions is critical in evaluating scientific propositions or models. Although assumptions are often stated and listed in the BDCP Plan, they are noticeably absent in the EIR/EIS from many statements about the effectiveness or presumed benefits of BDCP actions. Throughout the document, the lack of clearly and consistently stated assumptions weakens the scientific foundation of the EIS/EIR.
6. *The adaptive management process is not fully developed.*—Adaptive management is the key to successful implementation of BDCP, and the proposed organizational infrastructure to support adaptive management is well described in the Plan. Although adaptive management is mentioned frequently in the EIR/EIS, however, details of how it will be designed and done are left to a future Adaptive Management Team to define. Consequently, it is unclear how adaptive management will be integrated into the implementation of BDCP, whether the scientific skills needed to plan and oversee adaptive management will exist in the Implementation Office and on the Adaptive Management Team, and whether the capacity to conduct the monitoring and analysis needed for adaptive management will be available. Because conditions in the Delta and responses to BDCP actions may change quickly, the adaptive management process must be nimble, yet the organizational structure may delay rather than expedite needed adjustments. Performance measures needed to evaluate actions and make adjustments in actions are not addressed substantively in the EIR/EIS (although the BDCP Plan has a detailed listing of performance measures linked to its Biological Goals and Objectives). BDCP actions are unlikely to play out as planned, so it might be useful to view them as planned experiments or hypotheses to be tested. Accordingly, it would be prudent to have contingency plans generally outlined *before* discovering that things aren't working. Yet contingency plans are rarely mentioned. We have misgivings about how well the adaptive management process proposed will actually function as a key component of BDCP.
7. *Risks are not modeled or fully evaluated.*—There are risks with almost every action proposed as part of BDCP. These risks can interact and cascade, with potentially major consequences. Formal tools of risk assessment and decision theory, which assign probabilities, uncertainties, and magnitudes to various risks, could be used to evaluate which aspects of BDCP may be most vulnerable to high-consequence risks and help to prepare for contingencies. We found no indications that formalized risk assessment has been used to any great extent in the development of BDCP.

8. *Descriptions of the alternatives for conveyance structures and operations do not encourage explicit comparisons.*—The central purpose of the EIR/EIS is to clearly describe the alternative water conveyance options. This includes their effects on natural communities, covered species, and selected non-covered species as well as their compliance with the regulatory requirements of NEPA and CEQA through the implementation of additional actions. Each alternative is examined in great detail, in a consistent manner, in the EIR/EIS. However, because no overall framework draws together the specifics of the alternatives in a clear way, it is difficult to compare alternatives. Consequently, it is challenging to develop a rigorous assessment of the relative strengths and weaknesses of the alternatives. Moreover, each alternative suffers from the areas of concern mentioned above, but they do so in different ways, further confounding comparisons.

Improvements in the scientific framework of BDCP

Successful implementation of BDCP will benefit from several science-related improvements:

1. *Adaptive institutional, regulatory, scientific, and financial capacity must be developed.*—An ability to adapt implementation to changing conditions is the most important need for BDCP. It is implausible to expect that the Delta's future will be exactly as assumed by any EIR/EIS analysis. Without the institutional, regulatory, legal, scientific, and financial capability to adapt, led by suitable governance, BDCP will be unable to achieve its state and stakeholder objectives. There is little in the Plan and the EIR/EIS to inspire confidence that the many individual agencies, each with narrow responsibilities, will have sufficiently sustained incentives and resources to approach the kind of integration needed for adaptive management to be effective for the Delta, and to implement BDCP.
2. *An integrated Science Plan and Program is critical.*—The science for BDCP must be clearly linked to the many related scientific problems of managing the Delta, and this scientific capability must be widely perceived as independent and transparent. Science that is fragmented and partitioned among entities is open to advocacy, which is unlikely to improve conditions in the Delta and will ultimately work against the long-term interests of the state and stakeholders. Most of the major science activity must be held in common. If Delta management is to be guided by science, then science will have to become more integrated and aggressively pursued. The Delta Science Plan provides a framework for such integration
3. *A range of pilot restoration actions should be started early.*—Pilot restoration actions should be initiated as soon as possible, within a scientific framework that will allow BDCP and others to test, refine, and improve the effectiveness of restoration. This approach will reduce uncertainty and costs over the time of this project.

4. *Risk-based decision analysis can provide useful insights.*— A simple risk-based decision analysis is likely to provide insights into identifying and developing promising options covering a wide range of contentious issues. Although it lacks a proper accompanying risk-based decision analysis, the so-called “decision tree” for operations for fall X2 is just one example of the kind of structuring that could be useful for many of the operational aspects of BDCP and broader Delta management.
5. *Take advantage of the current drought.*—The current drought provides an opportunity to demonstrate the ability of federal, state, and local agencies to collaborate in adaptively managing a complex and changing problem for multiple objectives. In essence, this could be a test of the adaptive management process proposed in the BDCP Plan and a chance to apply these techniques early in the development of BDCP.

Improvements in the BDCP EIR/EIS document

An EIR/EIS is a major document intended to inform policy-makers and the public about the comparative beneficial and detrimental consequences of alternative project actions, including a reasonable no-action alternative. The BDCP EIR/EIS provides a thought-provoking and exhausting wealth of information about the Delta and the likely impacts of the proposed alternatives. However, like much of the technical work behind California water policy and management, this wealth of information and data is not organized in a way that can usefully inform difficult public and policy discussions. Some necessary improvements for the final document are provided below; additional details appear in the chapter reviews in Appendix B.

1. *Provide a clear and concise comparison of water-conveyance alternatives.*— The EIR/EIS is a document intended to guide the selection of alternatives based on performance and consequences. The Executive Summary should focus on guiding the reader through a concise presentation of the alternatives and their relative impacts on major Plan objectives and operations and the physical, biological, sociological, and economic resources of the Delta.
2. *Include meaningful summaries for each chapter.*— Each chapter should begin with a sharply focused summary of the main points, conclusions, and important unresolved issues.
3. *Clarify performance indicators.*— Including clearly defined performance indicators for BDCP actions in both the chapter texts and the Executive Summary would help to focus a discussion and comparison of alternatives and would greatly improve the usefulness of the document.

4. *Discuss uncertainties in each chapter.*— Presentation and discussion of the results of major analyses should include some indication of the uncertainty of those results. For quantitative and model-based analyses, this could include likely upper and lower bounds as well as an average or central tendency. For other analyses, a qualitative assessment of relative uncertainty or confidence in the results would be useful. A discussion of the implications of these uncertainties and possible actions to reduce uncertainty would be helpful.
5. *Blotter and consolidate the support framework for adaptive management.*— As currently described (in the Plan; there is no description in the EIR/EIS), the adaptive management process seems unlikely to be workable in terms of financial and scientific support, institutional authority, or regulatory flexibility. It is critical that the management, regulation, and science supporting adaptive management for BDCP be integrated within a larger framework for adaptive management for the Delta. The EIR/EIS would benefit from a concise discussion of how the approaches to adaptive management described in the BDCP Plan, the Delta Plan, and the Delta Science Plan might be blended into an effective and facile framework.
6. *Identify and list important assumptions in each chapter.*— Although presentation of many assumptions may best be left to appendices, the most important assumptions and their implications should be discussed in the main chapter texts. This is especially important for the more analytical chapters.
7. *Include risk-based decision analysis.*— An overall risk-based decision analysis of alternatives that includes some major contingencies would provide a more rigorous basis for structuring the document and developing a preferred alternative for BDCP. This analysis should explicitly incorporate uncertainty into the comparisons of alternatives, while supporting other decisions about BDCP actions.
8. *Refine the treatment and description of BDCP alternatives.*— Continued development of BDCP alternatives and plans for their implementation will improve their performance and adaptability. Suggested improvements should be included and highlighted in the final EIR/EIS. A risk-based decision framework could be used to explore how potential adjustments in, for example, the sizing and placement of habitat restorations or the capacity of Delta conveyance might reflect opportunities or problems likely to arise in the future.
9. *Consider appropriate time frames for permitting BDCP actions.*— Because of the many uncertainties in BDCP actions and their consequences and the intention to use adaptive management to adjust practices when necessary, it would be appropriate to include in permits explicit intermediate milestones and opportunities for mid-course evaluation and correction within the 50-year time period of BDCP.

10. *Spell out the details of programmatic Conservation Measures.*—Currently, CM1 (water conveyance alternatives) is treated at a project level in the EIR/EIS, whereas the other Conservation Measures are dealt with at a less detailed program level. Providing more detail wherever possible would enhance evaluations of the effectiveness and consequences of these other Conservation Measures; even specifying ranges of possibilities or approximate actions would be helpful.

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